APPENDIX A
ENGLISH TRANSLATION OF

INTERNATIONAL PATENT PUBLICATION WO 02/03096

DEVICE FOR PRODUCING AN OSCILLATOR SIGNAL

The invention concerns a device according to the preamble of the claim 1 as well as a method according to the preamble of the claim 15.

In the field of radio-frequency technology it is advantageous and typical to not evaluate microwave signals directly, but rather to evaluate them in relation to a comparison or, respectively, reference signal. For instance, this concerns systems for data transfer in which a transmitter (which is called a base station in the following) sends a base signal and this base signal is compared or, respectively, further processed in a receiver station with a comparison signal that is generated in the receiver. For example, mixers or demodulators are frequently used with which the received signal is reduced with a comparison signal in a mostly lower-frequency band. Since the radio-frequency base signal normally serves only as a carrier on which a lower-frequency modulation or, respectively, information is impressed, the carrier can, for example, be suppressed via this conversion and the information contained in the modulation can thus be concluded more simply.

Given what are known as transponder, transceiver, backscatter or radar systems, a base signal (that, in this case, is also called an interrogation signal) is sent to the transponder or, respectively, to a reflector and from here transferred (possibly modified) as a response signal back to the base station and received there. The evaluation in the base station then mostly occurs in the manner that the sent base signal itself serves as a comparison signal with which the response signal is evaluated in order to thus conclude information loaded (for example) in the transponder or sensor information such as, for example, the delay of the signal and thus the length of the transmission path.

In such systems it is also typical that the received base signal in the transponder is likewise processed with a comparison signal before a response signal is sent back or, respectively, the comparison signal itself (possibly loaded with characteristic

information) is sent back to the base station. Such transponders with their own source for return transmission of the response are designated in the following as active transponders or, respectively, active backscatters. Relative to this systems without their own source, as such those that merely send back the base signal (possibly modified and amplified), are designated as passive.

In all cases it is advantageous when the comparison signal possesses an optimally exact relationship (with regard to frequency and phase) with the base signal or, respectively, to its carrier. The more exact that this frequency and phase relation is, the simpler and/or more failsafe that information contained in the base signal or, respectively, in the response signal can be concluded. If the base signal is sent from a base station and is received and further processed in the described manner in a spatially-remote receiver station, this desired frequency and phase relation is not provided without further measures since both signals (thus the base signal generated in the base station and the comparison signal generated in the receiver station) originate from different sources.

For the cited reasons it is therefore of general interest to couple the comparison signal to the base signal in some manner. Different methods and arrangements are typical for this purpose. A simple frequency relation can be realized in that oscillators with high frequency stability are used in the transmitter and in the receiver. However, an unknown residual frequency offset always remains here due to, for example, temperature or deterioration drifts. For this reason the phases of both sources cannot stand in fixed relation. More elaborate arrangements possess means that are suitable for determination of the residual frequency offset and/or the residual phase offset. The base signal source or the comparison signal source can then be controlled or regulated based on the determined deviation values. For this different frequency and phase control loops are used. Additional interrogation signals or, respectively, values can likewise be formed from the residual signals, which interrogation signals or, respectively, values are drawn upon for further signal processing. Manifold methods regarding a carrier recovery are customary in

the field of communication technology. The synchronization of oscillators by means of what is known as "Injection Locking" is likewise prior art (see, for example, M. Wollitzer, K. Buechler and E. Bibbl, "Supramonic Injection Locking Slot Oszillators", Electronics Letters, 1993, Vol. 29, Nr. 22, pages 1958 through 1959). For the most part the oscillator to be regulated is hereby deposoted [sic] on a strong, stable oscillator. The connection typically ensues in CW operation (continuous wave operation), whereby subharmonic oscillator modes can also be used for application. A regulation of the reference source based on an interrogation signal is in particular generally error-prone or, respectively, complicated when the receiving station operates not only as a pure receiver but rather (as a transponder, transceiver or as an active backscatter) also sends back the interrogation signal (possibly provided with additional information) as a response signal. In this case it is to be taken care (via what are known as multiplexing methods) that the response signal (which normally exhibits a significantly higher amplitude than the interrogation signal) does not overcouple on the reception branch and/or on the control loop. For example, time, frequency or polarization multiplexing methods are typical. In time multiplexing the interrogation signal is only answered with a time offset. The greater the time offset and/or the higher the microwave frequency, the more complicated it is to keep a phase coherency between the source of the base station and that of the transponder. Extremely small relative frequency deviations of the sources that are unavoidable due to drift effects, phase noises and control inaccuracies lead to an undefined phase ratio of the sources in a relative short time given very high-frequency signals. Given frequency multiplexing, the interrogation signal in the transponder is converted to a different frequency before it is sent back. Dividers, multipliers or additional signal sources and mixers and, if applicable, a plurality of antennas that are tuned to the respective frequencies are required for this. The principle of the frequency multiplication or, respectively, division frequently collapses in practice at the radio-technology authorization since the frequencies of the approved bands normally do not stand in a whole-number division ratio.

If the distance or a distance change between a base station and a transponder should be determined, perhaps according to the principle of the Doppler or frequency modulation radar, an even greater requirements [sic] exist for the phase relation between the sent interrogation signal an the returned response signal. In this case the phase of the response signal sent back by the transponder must correspond exactly (possibly except for a constant offset) to the phase of the signal received in the transponder, such that the interrogation signal sent by the base station and the response signal received by it after return transmission by the transponder possess a phase difference that is proportional to the distance between base station and transponder, however which otherwise does not change over time.

Since this phase coherency of two radio-frequency sources is very difficult to realize in practice, for the most part passive backscatter transponders are used today that possess no signal sources of their own but rather merely reflect back the interrogation signal, possibly amplified. Such systems are, for example, described in Klaus Finkenzeller [sic] "RFID-Handbuch", 2nd edition, Carl Hanser Verlag, Munich, 1999. Given such passive backscatter systems it is disadvantageous that the transmitted signal must run the path from the base station to the transponder forward as an interrogation signal and back as a response signal and that the signal-noise ratio of the entire transmission path therefore decreases proportional to the fourth power of the distance. Due to the free field attenuation strongly increasing with the frequency, in particular very high-frequency passive backscatter transponders in the gigahertz range can barely be realized with a satisfactory signal-noise ratio. This is therefore in particular unsatisfactory since in principle gigahertz systems (due to the high available bandwidth) would be very advantageously usable both for remote measurement and with regard to fast data transfers.

In addition to this systems exist in which the base signal is not simply reflected back (and thereby possibly amplified further) but rather in which the response signal is actively constructed based on the base signal, for example by an active

oscillator. For the active construction the relevant parameters are extracted from the base signal and the oscillator signal is independently generated based on the extracted parameters. It represents a reconstruction of the base signal insofar as it coincides with it in terms of the desired parameters. Beyond the rough reconstruction, the oscillator signal can also be impressed on still further signal components in order, for example, to transfer additional information.

If a new signal based on a received signal is generated in this manner with an active oscillator as a separate source, the path from the base station to the transponder is thus respectively traversed only once by the signal of a source. In this case the signal-noise ratio is only inversely proportional to the second power of the distance. Added to this is that other attenuations and losses on the transmission path act only once and not twice on the signal. The signal-noise ratio is therefore better by orders of magnitude (in particular given larger distances and/or high frequencies) than given passive backscatter systems in which the signal must negotiate the path from the base station to the transponder and back.

A more complex transponder in which the transponder backscatter operates with its own source is executed in the German patent application 19946168.6. This system operates in a time multiplex and avoids some of the shown disadvantages due to a clever selection of modulation and regulation. However, it is relatively complicated. Related to this are the methods that are used in GPS (Global Positioning System). Other systems are, for example, cited in US 5,453,748 or in C. Luxey, J.-M. Laheurte, "A Retrodirective Transponder with Polarization Duplexing for Dedicated short-range Communications", IEEE Transactions on Microwaves Theory and Technics, Vol. 47, Nr. 9, pages 1910 through 1915, or in M. M. Kaleja et al., "Imaging RFID System at 24 Gigahertz for object Localization [sic], 1999 IEEE MTT-S International Microwave Symposium, Anna Hein, USA, Vol. 4, pages 1497 through 1500.

It is the object of the invention to indicate a particularly simple method with which it is possible to quasi-phase coherently tether a signal source in the radio-frequency range to a comparison signal. Quasi-phase coherently thereby means that the phase difference between the base signal and the generated comparison signal is small, whereby the term small is to be seen in relation to the intended communication or, respectively, measurement task. For example, the value $\pi/10$ (thus approximately 20°) is frequently used as a limit for a small phase deviation. Such signals with only small phase deviations are designated as quasi-phase coherent in the following and the time span in which this coherency exists is designated as a coherency time length.

The cited object is achieved via a device with the features of the claim 1 and via a method with the features of the claim 15.

It is hereby significant that not only are the oscillations of the active oscillator quasi-phase coherent relative to the base signal, but rather that the excitation of the active oscillator already occurs in a quasi-phase coherent manner. While the excitation of the active oscillator ensues via thermal noise in devices and methods according to the prior art and the oscillations of said oscillator are only made quasi-phase coherent later via an elaborate regulation process and a lock-in, in the subject matter the registration of the oscillator is already excited in a quasi-phase coherent manner by the base signal, meaning that it is already quasi-phase coherently excited and the phase coherency is therewith produced virtually automatically. The oscillation of the oscillator thus can be quasi-phase coherently initialized or, respectively, is quasi-phase coherently initialized.

The fundamental idea of the invention is that an oscillator is located in a labile equilibrium in the ground state and, when it is activated, must first be excited to oscillate via a developed foreign energy feed anyway. Only after this initial activation is the feedback active with which the oscillation is maintained. For example, the thermal noise is typically used at such an initialization of an

oscillating circuit. This means that an oscillator builds up with a random phase and amplitude and then oscillates at its frequency predetermined by its resonance circuit. However, if an external excitation signal is injected into the oscillator upon startup, its frequency lies within the bandwidth of the resonance circuit and its power appreciably lies above the noise output, the oscillator does not build up randomly but rather synchronously with the phase of the excited base signal. Depending on the frequency difference between the excited base signal and the oscillator signal and dependent on the phase noise of both oscillators, this quasi-phase coherency persists for some time.

The difference of the present invention relative to the known passive devices and methods exists in the use of an active oscillator. The base signal is thus not simply reflected back; rather, before the return transmission an oscillator signal is actively constructed nearly noise-free with a separate quasi-phase coherent source. Given otherwise similar function the inventive system therefore has a significantly higher rnge [sic] than passive systems according to the prior art.

The oscillator signal of the active oscillator can serve as a response signal or comparison signal depending on whether it is a unidirectional or bidirectional signal transission [sic].

Furthermore, control loops for a possible carrier recovery can be foregone given the inventive device. A particular advantage exists given transponder arrangements in that no time, frequency or polarization multiplexing is necessary at all since the base signal and oscillator signal have no influence or, respectively, only have an influence in the desired manner at the beginning of the tuning process and afterwards are quasi-phase coherently independent of one another.

It is advantageous when the device comprises a switching means for switching of the quasi-phase coherent excitation capability of the active oscillator. This

switching means serves to shift the active oscillator into a state from which it can (excited by the base signal) build up to the base signal.

For a switching of the excitation capability the oscillations do not necessarily have to be completely activated and deactivated. For example, when the active oscillator can oscillate with different modes, a second mode can simply be switched while the first oscillates further. Even given only one mode the oscillations do not have be completely deactivated; rather, a damping is normally sufficient so that the base signal is sufficient for the next quasi-phase coherent excitation.

If the excitation capability of the active oscillator is reactivated after the coherency time span, the quasi-phase coherency persists over a longer time span.

If, in further development, the quasi-phase coherent excitation capability of the active oscillator is repeated, the quasi-phase coherency also persists over longer time spans. This can be achieved in that the switching means is fashioned such that it switches the active oscillator with a predetermined sequence. This sequence can be a complex sequence that is itself a carrier of information or also a cyclical repetition in the form of a clock speed.

The duration between successive switches of the excitation capability advantageously corresponds to approximately the coherency time span. However, a faster switching is also possible without the quasi-coherency between base signal and oscillator signal being lost. On the other hand, when the quasi-phase coherency is necessary only in specific time segments, the duration between two successive activation processes of the excitation capability can also be selected longer than the coherency time span. Given a cyclical sequence in the form of a clock pulse, the cycles of the coherency time span are correspondingly adapted.

If the switching of the active oscillator is repeated and the active oscillator repeatedly builds up to the base signal in a quasi-phase coherent manner, the oscillator signal generated by the active oscillator can thus be understood as a sampled duplicate of the base signal. Given adherence to the sampling theorem a signal is described completely by its sample values. The deactivation time duration of the active oscillator is reasonably not distinctly longer than the activation time span, thus not distinctly longer than the coherency time span. The adherence to the sampling theorem therefore immanently results due to the coherency condition. According to the sampling theorem the phase difference between two sample points must be smaller than 180°. This condition is less restrictive than the quasi-coherency condition. As a consequence, from the information-technical viewpoint the signal of the switched oscillator is, in spite of the switching process, to be viewed as an image of the comparison signal or, respectively, carries its entire information content.

The excitation capability of the active oscillator can be switched relative simply in that the oscillator itself is switched. The device can correspondingly comprise a means for activation and deactivation of the active oscillator. For switching of the oscillator any means is suitable that has the effect that the oscillation condition of the oscillator is provided or, respectively, no longer provided. For example, in the oscillating circuit the amplification can thus cut off, attenuations or delays (phases) can be altered or the feedback branch can be disconnected.

Besides being excited to its base mode, the active oscillator can also be quasi-phase coherently excited to one of its subharmonic oscillation modes. The base mode or a subharmonic oscillation mode of the base signal can thereby serve for excitation.

If the device for identification is used as an ID tag or for communication, the coding can, for example, ensue via the sequence of the switching of the excitation capability of the oscillator, in particular in that the switching means exhibits a

clock rate corresponding to the desired coding. Alternatively the device comprises an additional modulation unit with which the quasi-phase coherent signal is modulated before the return transmission.

As was already presented, the coherency time span is dependent on the frequency difference between base signal and oscillator signal. The more precisely that the frequencies coincide, the longer that the phases of the signals are nearly identical. In order to extend the coherency time span (whereby the clock rate of the switching means can also be kept low), it can be advantageous to provide means that are suitable to adaptively adapt [sic] the oscillator frequency to the frequency of the base signal.

In the selection of the active oscillator it is to be noted that its settling time should be small relative to the coherency time length. The performance of the oscillator should therefore not be selected too great. The performance should, however, also not be kept too low since oscillators with low performance typically exhibit in [sic] high phase noise.

Given an arrangement with a device for generation of an oscillator signal and with a base station in which the base signal is generated and from which it is sent to the device, the oscillator signal can be sent from the device back to the base station as a response signal to the base signal.

In an arrangement in which the device communicates with a base station via base and oscillator signals as interrogation signals and response signals, the base station advantageously comprises a bandpass filter whose center frequency approximately corresponds to the clock rate of the switching means and/or means in order to eliminate the influence of the clock rate. Such means can be an additional mixer or a rectifier and a low-pass filter.

Further advantageous and inventively significant features result from the specification of exemplary embodiments using the drawings. Thereby shown are

Figure 1 a device with oscillator and switching means,

Figure 2 an arrangement with base station and transponder,

Figure 3 a device with phase shifter for use as an ID tag,

Figure 4 a device with an oscillator variable in terms of its frequency and

Figure 5 a device with amplifier and resonator.

Figure 1 shows the basic elements of the device. A more or less larger portion of a base signal A is coupled to an oscillator 2 via an input 1. An electrical base signal and oscillator signal form the basis for the shown examples. The invention can, however, also be realized for optical, acoustic or other signals. The base signal A excites the oscillator 2 in a quasi-phase coherent manner to oscillations, whereby this generates the signal B. The signal B is decoupled from the oscillator and discharged via an output 3. The input 1 for the base signal A and the output 4 for the oscillator signal B can be wholly or partially identical. However, they can also be realized separate from one another.

The oscillator 2 is cyclically activated and deactivated with a switching means 4 for clock control. Its quasi-phase coherent excitation capability is also switched via the activation and deactivation.

The oscillator 2 is fashioned such that, on the one hand, it is not excited to oscillation by thermal noise, however on the other hand such that the base signal A injected into it is sufficient in order to excite quasi-phase coherent oscillations from base signal A.

Figure 2 shows the arrangement of a transponder/backscatter system. The base signal A of the base station 6 is generated with a base station oscillator 7 and emitted via an antenna 8 of the base station 6. The base signal A of the base station 6 is received as an interrogation signal with the antenna 5. The switched oscillator 2 is excited quasi-coherently relative to the base signal A in the manner described above and oscillates in order to generate the oscillator signal B. The oscillator signal B is sent back as a response signal via the antenna 5 of the transponder 9 and to the antenna 8 of the base station 6.

Here the oscillator signal B is separated from the base signal A via a directional coupler 10 and mixed with a part of the signal from the base station oscillator 7 in a mixer 11. The mix components that are not of interest are suppressed with a filter 12. This filter is advantageously executed as a bandpass filter, whereby the center frequency corresponds to the clock rate of the switching means 4. The introduced arrangement can be used both for the purpose of communication or, respectively, identification and for determination of the distance or, respectively, change in distance between base station 6 and transponder 9.

If the system is used for distance measurement, the base station 6 advantageously comprises further elements such as, for example, an additional mixer or a rectifier and a low-pass filter with which the influence of the clock rate is eliminated. However, the mixing signal can also be directly evaluated with a suitable spectral analysis, whereby the influence of the clock rate is to be taken into account.

Furthermore, for a distance measurement it is advantageous when the base station oscillator 7 is executed as an oscillator variable in terms of the frequency (for example as a VCO (voltage controlled oscillator)), such that the base signal A can assume more than one frequency value. In principle all embodiments (as given a typical backscatter) are conceivable as they are also executed in the German patent application 19946161.9 (the whole content of which is herewith referenced). The

difference of the present invention relative to the known methods exists in the type of the transponder, namely in that the base signal that is already distinctly damped in terms of signal level by the transmission from the base station to the transponder is not simply reflected back, but rather is actively constructed generated [sic] with nearly noise-free with a separate, quasi-phase coherent source and then sent back with the full level of the source. Given an otherwise similar function the inventive system therefore has a significantly higher range or, respectively, a significantly higher signal-noise ratio than the systems according to the prior art.

If the transponder 9 is used for identification as an ID tag or for communication, the coding can, for example, ensue via the clock rate of the switching means 4 and/or via an additional modulation unit with which the quasi-phase coherent oscillator signal is modulated before the return transmission. The type of the modulation can correspond to the general prior art which was already referenced above. The demodulation in the base station 6 is also to be realized simply and in a fail-safe manner due to the quasi-phase coherency of both carrier signals (thus of base signal A and oscillator signal B). The aforementioned advantages relative to normal backscatter ID systems additionally result for greater ranges. In the inventive arrangement control loops for a possible carrier recovery can be foregone.

Using the arrangement the coding of an ID tag can, for instance, be realized with a phase modulation. Figure 3 shows one possible embodiment. The shown system has merely been expanded by a modulator/phase shifter 13 relative to the preceding transponder circuits. Depending on code value C, the quasi-phase coherent oscillator signal is delayed by a determined phase value. Given a binary coding this is, for example, by 90° or 180° given code value 1 and by 0° given code value 0. An amplitude or frequency coding is thereby likewise conceivable. The advantage with regard to the demodulation in the base station also result given this type of the modulation.

The coherency time span is dependent on the frequency difference between base signal A and oscillator signal B, meaning on the frequency difference between the oscillator 2 and the base station oscillator 7. The more precisely that the frequencies of the oscillators coincide, the longer that the phases of the oscillators are nearly identical. In order to extend the coherency time span and therewith to be able to keep the clock rate of the switching means 4 low, it can be advantageous to provide means that are suitable to adaptively adapt [sic] the oscillation frequency of the oscillator 2 to the frequency of the base signal A. Figure 4 shows a possible embodiment for this. Different than in the base circuit from Figure 1, this device comprises no fixed frequency oscillator but rather an oscillator 14 that is variable in terms of the frequency. A portion of the oscillator signal B of the oscillator 14 that is variable in terms of its frequency is mixed with the base signal A with the aid of a mixer 15. The difference mix signal is extracted with a filter 16, advantageously a low-pass filter. The frequency of the difference mix signal, which is a measure for the frequency deviation of the two oscillators, is then supplied to a regulator or a controller 18 as a control variable in connection with a signal pre-processing 17. The regulator or the controller 18 adjusts the oscillator 14 such that the frequency deviation of both oscillators 14, 7 is optimally minimal. The primary object of the signal pre-processing 17 exists in the frequency determination. The frequency determination can in principle be implemented with an arbitrary switching or, respectively, signal processing according to the prior art. The regulator or the controller 17 is likewise to be fashioned according to the prior art. However, it is hereby expressly noted that only the frequency must be controlled or, respectively, regulated; the phase coherency results due to the inventive design of the device. A phase control loop can therefore be foregone. Since generally no necessity exists to select the clock rate of the switching means 4 at a particularly low frequency, the regulator or the controller 18 of the oscillator 14 also does not have to ensue [sic] particularly exactly. Given the limits cited in the preceding for a small phase deviation of $\pi/10$, it is sufficient when the frequency deviation is 10 times smaller than the clock frequency of the switching means 4.

In a numerical example: if the transmission path is realized at 24 GHz and the oscillator 2, 14 of the transponder 9 is switched with 100 MHz, the 24 GHz base station oscillator 7 and the 24 GHz oscillator 2, 14 may deviate from one another in terms of frequency by up to 10 MHz. After each activation it [sic] oscillator 2, 14, in the coherency time span of 5 ns this oscillates over 120 periods in a quasi-phase coherent manner relative to the base signal A, meaning that the maximum deviation amounts to $\pi/10$. After deactivation and re-activation 120 quasi-phase coherent oscillations result in turn etc. From an information-technical point of view, the base signal A and the oscillator signal B are thus quasi-phase coherent over a longer time span.

Given the selection of the oscillator 2, 14 it is to be noted that its settling time should be small relative to the coherency time span. The performance of the oscillator 2, 14 should therefore not be selected too high. Referring to the numerical example cited above, this means (for example for a 24 GHz oscillator with, for example, a performance of 10) that it build up in approximately 400 ps, which is distinctly shorter than the coherency time span of 5 ns. The performance should, however, also not be designed too low since oscillators with lower performance typically exhibit a high phase noise. However, as was presented before, a high phase noise can unnecessarily shorten the coherency time span. Given the selection of the soc 2, 14 a compromise is to be made that is suitable in this sense.

In the microwave range oscillators are typically executed as a resonance circuit. As is apparent from Figure 5, such a resonance circuit comprises a radio-frequency transistor 19 for amplification and a resonator 20 or, respectively, a bandpass filter. The resonator 20 is, for example, an LC oscillating circuit or a dielectric structure. The circuit can, for example, be designed in a microstrip technique or also in a coplanar technique. If the oscillator is connected with an antenna 5 it is particularly predisposed for the described principle. For example, the oscillator is

switched in that the amplifier 19 is activated and deactivated with the switching means 4.

The invention is particularly suited for microwave systems with operating frequencies over 10 GHz since, according to the present prior art, the possibilities for direct phase regulation of the carrier are limited or, respectively, are very complicated and expensive.

It is to be noted that the general coherency between base signal and oscillator signal is limited only by the phase noise of the oscillator 2, 14 and of the base station oscillator 7. Even when the frequencies of both oscillators are different, the phase correlation between the signals after the tuning process remains deterministic (up to the phase noise). In principle all embodiments that are cited in the present invention can thus also be transferred to slower switching clock speeds, thus such coherency time spans that are determined only by the phase noise. In this case care must only be taken in the method that the temporal phase change that results due to the frequency difference of both oscillators is taken into account or, respectively, compensated in the evaluation. This can, for example, ensue on the hardware side via additional mixers/demodulators or on the software side via a suitable frequency and phase evaluation. As was shown previously, this additional expenditure can advantageously be avoided in that the oscillator to be coupled is activated and deactivated sufficiently quickly.

Patent claims

1. Device for generation of an oscillator signal (B) based on a base signal (A) with
   - an oscillator (2, 14) for active construction of the oscillator signal (B) via oscillations,
   - an input (1) for the base signal (A) and
   - an output (3) for the generated oscillator signal (B),

   characterized in that
   the oscillator (2) can be excited by the base signal (A) for generation of the oscillator signal (B) quasi-phase coherent relative to the base signal (A).

2. Device according to claim 1,
   characterized in that
   the device comprises a switching means (4) for switching of the quasi-phase coherent excitation capability of the oscillator (2).

3. Device according to claim 2,
   characterized in that
   the switching means (4) is fashioned such that the oscillator (2) can be switched in a predetermined sequence.

4. Device according to claim 3,
   characterized in that
   the time between successive switchings of the quasi-phase coherent excitation capability of the oscillator (2) is smaller than or equal to the coherency time span.

5. Device according to at least one of the preceding claims,
   characterized in that
   the device comprises a means (4) for deactivation of the oscillator (2).

6. Device according to at least one of the preceding claims, characterized in that the device comprises means (5) for emission of the oscillator signal (B).

7. Device according to at least one of the preceding claims, characterized in that the device comprises a means (4, 13) for coding of the oscillator signal (B).

8. Device at least according to the claims 3 and 7, characterized in that the switching means is fashioned as a means (4) for coding.

9. Device at least according to claim 7, characterized in that the means (13) for coding is an additional modulation unit.

10. Device according to at least one of the preceding claims, characterized in that it comprises adjustment means (15, 16, 17, 18) in order to adaptively adapt the frequency of the oscillator (2) to the frequency of the base signal (A).

11. Device according to at least one of the preceding claims, characterized in that the oscillator (2) exhibits a settling time that is small relative to the coherency length.

12. Device according to at least one of the preceding claims, characterized in that the oscillator (2) can be excited via the base mode and/or a subharmonic mode of the base signal (A).

13. Arrangement with a device at least according to claim 3 and with a base station (6) for reception of the oscillator signal (B), characterized in that the base station (6) comprises a bandpass filter (12) whose center frequency approximately corresponds to the clock rate.

14. Arrangement with a device at least according to claim 3 and with a base station (6) for reception of the oscillator signal (B), characterized in that the base station (6) comprises means in order to eliminate the influence of the clock rate.

15. Method for generation of an oscillator signal (B) based on a base signal (A), in which
- an oscillator (2) is excited by the base signal (A) in a manner quasi-phase coherently relative to the base signal (A),
- the oscillator (2) oscillates upon the inducement and
- the oscillator (2) actively constructs an oscillator signal (B) via the oscillations.

Siemens AG
Case No. P04,0344 (26965-3287)
Translation of Prior Art
WO 02/03096 A1
Inventor: Heide et al.

Translation / Bullock / 5810 words